Group 1 Recommendations – Faculty Collaboration and Inquiry; Making Teaching Public

1. Use guided *faculty* inquiry to create a focused and safe environment for collaboration.
   * We are still unclear – Who is guiding the inquiry? Are there established protocols, or are those going to be developed?
   * At Clark this was done primarily in FIGs
     + FIGs were cross-departmental, and involved discussion of strategies and sharing of strategies. Some were more topically focused, others less so, but all allowed a high level of public and safe inquiry. This is discussed further in our end-of-year report.
2. The inquiry process
   1. Starts with a targeted question around student learning.
   2. Iteratively gathers and collects evidence (possibly with a protocol) through activities such as FIGs, CATS, classroom exchanges and common assessments.
   3. Results in ongoing changing practice.

* Does this process always have to start with a targeted question? Or can this process arise from a conversation about strategies and general conversation?
* At Clark this process is being used in creating tools and resources for several projects
  + Math 089 Pilot inverted-classroom format
  + Math Academy
  + CATs, formative assessments, group-worthy tasks, etc.

Group 2 Recommendations – Changes in professional identities and faculty leadership roles

1. Departmental investment in creating a curriculum which supports deeper student understanding: Faculty take control of curriculum either by re-examining course learning outcomes or using backwards design – this process is not dictated by textbook content or other external forces but by what we *really* want students to understand. Faculty must have a willingness to rethink or move away from the traditional curriculum. This process allows for deeper learning experiences in the classroom and a shift in the role of faculty from lecturer to facilitator. Students explaining their mathematical thinking becomes a powerful learning activity.
   * As far as the curriculum revision is concerned, Clark has just started reconsidering the ABE/DVED curriculum using these principles. Their commitment is still in its early stages, primarily focused on minimizing overlap, and is not universal. This analysis has not been implemented in the math department.
   * Some faculty are using non-traditional curriculum and teaching strategies in the departments with members who are RPM participants, and have made the shift from lecturer to facilitator. This is not yet a wide-spread change in the departments. Some faculty are engaging in asking students to analyze and explain their thoughts, but again this is not widespread.
2. Proactive leadership in the (campus) community promoting math literacy: Math faculty should be actively engaged in shaping the campus cultural perception of mathematics. Specifically, faculty should advocate the fact that no one is born “bad at math” and lead a conversation that challenges the conventional wisdom regarding what math is and how it is learned.
   * Clark has not yet really started this conversation, aside from occasional informal hallway one-on-one conversations within the departments. This is discussed in the classroom with students in some cases, particularly those of teachers engaged in RPM. There has been a push to communicate an agenda to promote math literacy, but it is limited to a handful of individuals and is not globally visible.
3. *Provide interested instructors at all levels (adjuncts and FT) with time, space, and support to experiment (resulting in either success or failure) without fear of repercussion.*

Group 3 Recommendations – Assessment as part of the learning process

1. We use Formative Assessments frequently in the classroom to gain information about student understanding and we use that information to decide what to do next as teachers. Formative Assessments include, but are not limited to: common cross-course and cross-section questions, group quizzes/tests, multiple drafts of complex tasks, CATs, self-assessment.

* The RPM participants (including FIG members) at Clark college follow this recommendation (though not all mentioned types), but it has not spread beyond those people to the general instructor population. There has not been widespread adoption of the concept of multiple drafts of complex tasks, or group quizzes/tests even within the RPM participants.

1. As the use of Formative Assessment moves from educators tinkering in isolation to a becoming a visible part of our collective practice there is a noticeable shift in the adaptive capacity of a department to help students be successful. The visibility comes through participation in structured FIGs, formal lesson study, departmental initiatives using evidence-based practices, and state-wide retreats.

* We find this statement to be unclear. The statement “adaptive capacity of the department” is particularly difficult to interpret.
* Clark RPM members have been trying to make our work more visible to our colleagues and the college community at large. We have been working to produce and collect data and tasks that can be shared with others around the concept of formative assessment.

**\*\*\* Note: all of these outcomes deal with formative assessments. There is no discussion of common assessments of a summative nature, common core exams, etc. Is this intentional?**

Group 4 Recommendations – Designing and implementing contextualized tasks that promote meaning and relevance

1. Effective tasks were open ended, not listed with a,b,c,d to lead to the answer. Just ask the question and allow students to struggle in the practice of real problem solving. These require training, experimentation, reflection and support to create.

* This statement is a bit confusing. It seems that the suggestion is to not scaffold the problem, but to leave students to develop their own strategy as makes sense to them. The statement also implies that the instructors should resist the urge to rescue students.
* Participants at Clark have been working on this, primarily in the Math 089 Inverted Classroom pre-pilot and pilot. There has been a large push to remove scaffolding from the problems. There has also been some progress is this area in the ABE/DVED classes. The ability to not rescue students is something that several faculty members have sought training on, as well as working together to practice the skill.

1. A skilled facilitator is clear on their goals/outcomes beyond math skills, sets expectations for process and frustration in class, engages each student, guides the inquiry but does not give answers, and encourages productive struggle. Requires training, experimentation, reflection, and support.

* Reword: A skilled facilitator is necessary to effective creation and use of these contextualized problems to ensure that they promote meaning and relevance. Another question: what specific skills are meant by “beyond math skills”?
* This has been a big focus on the Math 089 pilot participants. Several of the instructors who have participated in the Ruth Parker trainings are practicing these skills, and are working to become skilled facilitators. There is a willingness to discuss these skills within the FIGs and get support in improving these skills. Many of the faculty feel that we have developed a safe environment to experiment around this issue without fear of failure – using negative experiences as a learning opportunity.

1. To promote contextualized tasks, adjust course outcomes and assessments to encompass the demands of contextualized tasks and real life applications. These outcomes can't just be math procedures, but rather the thinking skills to employ the math skills that they've learned in the real world.

* This is what ABE is supposedly all about at Clark. The math department has recently reworded its pre-college math outcomes to include this goal, but the assessments across the courses have not consistently caught up with the stated desire to value contextualized mathematics. This is also true in ABE, where the final exams are externally written. The GED is contextualized up to a point, but still does not reflect the emphasis on contextualized mathematics.

Group 5 Recommendations - Reasoning and evidence in classroom learning practices

1. Reallocate classroom time to make space to shift faculty role to coach from answer-machine, encourage multiple representations and strategies, and develop students’ abilities to articulate math.

* The Math 089 pilot has done this. The course has been redesigned to have longer class periods, and has moved lecture outside of the classroom using online resources. This allows for a focus in-class on high-challenge group tasks. The Math Academy will be including a required lab time to allow students to spend time working deeply on mathematics. Assessments that require students to articulate their understanding have been created. Clark faculty in the Math department chose a math class with lower content requirements to test this inverted structure, though there have been some attempts to implement these strategies in other more content-heavy classes as well. Many RPM participants at all levels are working on this recommendation in their classes.

1. Department-wide collaboration (such as faculty inquiry groups, exchanges and shared activity development) which enables the design of new ways to draw out student thinking, reasoning and sense making.

* Clark has had a fair amount of success with FIGs, starting with lesser participation at the beginning of the grant and expanding to include more faculty as the grant has progressed. There is not a majority of involvement in the departments with RPM participants. The same is true for exchanges and activity development. Most of the involvement is with adjunct faculty, who teach the majority of the pre-college math courses in the math department.

1. Explore and embrace research on theories of student learning, with time and framework for discussion.

* Is the research just on the theories of learning, or also on the best framework for discussion? This is unclear given the sentence structure. We put in a comma to make this (in our opinion) clearer.
* Again, most of the participation is among those individuals who are otherwise engaged in RPM. We have used our articles and readings to inform the majority of our work. It has provided a common framework for discussion, and a way to justify our work and intentions to the faculty who were not engaged in the work. Occasionally the research drew-in previously uninterested faculty because they were curious to hear more and see how the principles were being implemented.

**\*\*\*\* There seems to be a lot of overlap in the central themes from group 5 and some of the other recommendations.**